Chapter 8

System software and Application Software

8.1 System Software

These are the computer programs that control the system hardware and inter-act with the application software. These include the operating systems and the network operating systems.

8.1.1 Operating System

The Operating system (OS) is the master control program that provides an inter-face for a user to communicate with the computer. It manages hardware devices, manages and maintains disk file systems and supports application programs. The OS provides you with the tools or commands that enable you to interact with the computer. When you issue a command the OS translates it into code that the machine can understand and use. The OS ensures that the results of your actions are displayed on screen, printed etc. The OS performs the following functions:

- Displays the on-screen elements with which you interact which is the user interface

- Loads application programs such as word processing and spreadsheet pro-grams from backing storage into the computer's main memory

- Coordinates how programs work with the computer's hardware and other software

- Manages the way information is stored in the disks and how they are retrieved.

8.1.1.1 Types of Operating Systems

There are four major types of Operating systems.

1. Real-Time Operating Systems
These Operating systems support real-time applications. A real-time application is an application that responds to certain inputs very quickly. It accepts inputs, processes the inputs and gives the appropriate response in milliseconds or microseconds. Real-time applications are used in medical diagnostic equipment, life-support systems, machinery, scientific equipment and industrial machines.

Real-time operating systems are very fast and rather small. They may be embedded and built into the circuitry of a device. In such cases, they are not loaded from a disk drive. A real-time

operating system may support a single task or may support multiple tasks carried out at the same time.

2. Single-User/Single-Tasking Operating Systems

This type of operating system allows a single user to perform just one task at a time. A user may at any given time be able to do only one function such as printing a document, editing a text file, saving a file or downloading some content from a network server. The operating system considers a process as a task and simple OSs can handle only a single task at a time.

MS-DOS, Palm OS, used on the Palm handheld computers are examples for this type of operating systems. They take up very little space in the backing storage or in the main memory when they are running and do not require sophisticated expensive computers.

Figure 6A.1 – page 206 Ref 1

3. Single-User/Multitasking Operating Systems

These operating systems allow a user to perform two or more functions at any given time. For example an office user may print a very large document in his computer and while it is being printed he may edit another document in his computer, thus increasing his productivity. Similarly, you may need to share data between two different programs. For example, when you prepare a presentation in MS-PowerPoint you may want to include a graph that you have done in MS-Excel in it. In this instance, both programs have to be open at the same time so that data can be shared and one should be able to switch between the two programs quickly.

These operating systems tend to be complex and large as they have to support multi-tasking, support a GUI (graphical user interface), have two or more programs running at the same time and sharing data too. Windows 95 and Windows 3.1 are examples for this type of operating systems

Figure 6A.2 – page 206 Ref 1

4. Multi-User/Multitasking Operating Systems

These are powerful operating systems that support more than one user at a time, performing more than one task at a time. Multiple users use pro- grams that are simultaneously running on a single network server called the terminal server. A multi-user OS gives each user a complete environment called a user session, on the server. Each user's application runs within their user session on the server separated from all other user sessions. The software that makes this possible is called the terminal client. Most of the computing occurs at the server. This scenario is quite different from connecting to a network to access files and printers where the computing is done at the client computer locally. Examples of Multi-User/Multitasking Operating Systems are UNIX, VMS and mainframe operating systems such as MVS.

The advantage of these OSs are, when changes have to be made they can be done in the terminal server only. They also allow users to run applications, which require high computing power than the user needs on the desktop to run the client.

A disadvantage is that if the network connection to the server is broken, the users cannot run any of the applications that run on the server.

8.1.1.2 Providing a User Interface

When you work on a computer, you see and use a set of items on the screen. Taken together these items area called the user interface. The two most common types of user interfaces are graphical and command line.

8.1.1.2.1 Graphical User Interfaces

Most current Oss provides a graphical user interface (GUI). They are so called because you use a mouse or some other pointing device to work with graphical objects such as windows, menus, icons, buttons and other tools. This is sometimes known as a WIMP (Windows, Icons, Mouse, and Pointer) environment too. These graphical tools represent different types of commands. The GUI enables you to issue commands to the computer by using these graphical objects rather than memorizing and typing text commands.

Figure 6A.4 – page 208 Ref 1

The Windows XP GUI has several standard features, including the desktop, taskbar and start button. Shortcuts may appear in any of these areas. Shortcuts are often called icons. An icon usually represents an object, such as programs, folders, files, printers and shortcuts. Using the mouse or any other pointing de- vice, you can move the pointer and choose or activate a shortcut, telling Windows you want to use the resource that the shortcut represents. The items that appear on the desktop depend on the contents of the computer's hard disk, the resources it can access and the user's preferences. Therefore the desktops of any two any two machines running Windows can look different.

The following elements always appear on the Windows desktop.

Taskbar – Used to launch and manage programs
Start button – A permanent feature, click on it to open the Start menu

Shortcuts can be added to the desktop, the Start menu and other areas. When you start a program in Windows, a button representing it appears on the taskbar.

Programs can be launched from the Quick Launch Bar, a special section at the left end of the taskbar where you can add icons for quickly opening programs. When you start a program in Windows, a button representing it appears on the taskbar. When there are several programs open at the same time, you can switch among them quickly by clicking on the program's button on the taskbar.

By right-clicking an object in Windows - a small menu containing the most common commands associated with that object appears on the screen. This is a shortcut menu, which provides quick access to commonly used commands.

Figure 6A.5 – page 209 Ref 1
Figure 6A.6 – page 209 Ref 1

When you start a program, it is loaded into the computer's memory from backing storage and begins to run. A running program may take the entire screen or occupy a rectangular area in the screen called a window or it may appear only as a shortcut on the taskbar.

All resources on your computer can be accessed through windows. Some examples:

- View the contents of a disk

- Run a program and edit a document

- View a Web page

- Change system settings

In the Windows GUI programs share many of the same features, so you see a familiar interface irrespective of the program you are using. Common GUI features are:

Title bar, Menu bar, Toolbars, Scroll bars and many buttons.

The Title bar identifies the Windows' contents and contains the Minimize, Restore and Close buttons which let you hide, resize or close the window.

Menu bar- provides lists of commands and options for the specific program that is running

Toolbars – contain buttons that allow you to issue commands quickly

Scroll bars – Allows one to view parts of the program or file that do not fit in the window.

Although many windows can be open at the same time representing many programs, only one window can be active at a given time. The Title bar of the active window will appear in a deeper colour than those of the other visible windows.

Figure 6A.7 – page 210 Ref 1
Figure 6A.8 – page 210 Ref 1

Tasks can be performed by choosing commands from lists called Menus. Many programs feature a File menu containing commands for opening, closing, saving and printing files. In many cases, you can issue menu commands by using key- board shortcuts instead of the mouse.

Figure 6A.9 – page 211 Ref 1

Dialog boxes are special-purpose windows that appear when the OS or an application needs to give you some status and possible choice of actions or you need to tell a program or OS what to do next. A Dialog box conducts a "dialog" with the user seeking the information it needs to perform a task. A dialog box can even have more than one page, the pages being represented by tabs.

Figure 6A.10 – page 211 Ref 1

8.1.1.2.2 Command-Line Interfaces

Operating systems such as MS-DOS, UNIX and Linux use a command-line interface, which uses typewritten commands and not graphical objects to execute tasks. Users interact with the OS by typing strings of alphanumeric characters at a prompt on the screen. Even though,

people prefer to work with a GUI, a command-line interface gives you a quick way to enter commands.

Figure 6A.11 – page 212 Ref 1

8.1.1.3 Running Programs

The OS provides a consistent interface between application programs and the user. It also is the interface between those programs and other computer resources such as memory, a printer, or another program. Programmers write computer programs with built-in instructions called system calls that request services from the OS. They are known as calls because the program has to call on the OS to provide some information or service.

Eg.: When you request a word processing program to retrieve a file, you use the Open dialog box to list the files in the selected folder. To provide the list, the program calls on the OS. The OS goes through the same process whether the request comes from you via the desktop or from an application. The results then will be displayed on the desktop or sent back to the application that requested it.

Some other services provided by the OS in addition to listing of files are as follows:

- Saving the contents of files to disks

- Reading the contents of a file from disk to main memory of the computer

- Sending a document to the printer and activating the printer
- Providing resources that let you copy or move data/contents from one file to another or from one program to another

- Allocating RAM among the running programs

- Recognizing keystrokes or mouse clicks and displaying characters or Graphics on the screen.

Sharing Information

There are times when you want to share information between two applications. For example, you may draw a chart using a spreadsheet program. You may want this chart included in a document done using a word processing application. This kind of work is done by the OS using a feature known as the clipboard. It is a temporary holding place in the computer's memory for data or information that is being moved or copied. Clipboard is not another application but a part of the OS itself.

The versatility of the Clipboard has been extended further with a feature known in Windows as OLE – Object Linking and Embedding. A simple cut and paste between applications results in object embedding. The data or information known as an object is embedded in a new type of document. If you want to edit the embedded data, double click the embedded object, and the original application that created the data is opened to allow editing of the embedded data.

The data that is copied to and from the clipboard retains a link to the original document so that a change in the original document also appears in the linked data.

Figure 6A.13 – page 213 Ref 1

8.1.1.4 Managing Hardware

When programs run they need to use the computer's memory, monitor, disk drives, and other devices such as a printer. The OS is the intermediary between hardware and programs. In a computer network, the OS also mediates between your computer and other devices on the network.

Processing Interrupts

The OS keeps track of which programs uses which devices, responds to requests for memory and other devices from running programs and coordinates everything that hardware does. This avoids confusion and a breakdown in the work of the computer. The OS uses interrupt requests (IRQs) to help the CPU to coordinate processes.

Figure 6A.14 – page 216 Ref 1

Working with Device Drivers

In addition to using interrupts, the OS provides programs for working with special devices such as printers. These programs are called drivers because they allow the OS and other programs to activate and use or drive the particular hardware device. Most new software that you buy will work with your printer, monitor and other equipment without requiring you to install any special drivers.

Figure 6A.3 – page 207 Ref 1

8.1.2 Different Operating Systems

The progress of the personal computer over the past 30 years with each new version of OS has improved the ease of use, processing capability, reliability and ability to support new computer hardware. Today in addition to the OSs that consume hundreds of megabytes of disk space on personal computers, miniaturized OSs fit into small handheld portable digital assistants (PDA) and cellular phones.

Computer users have several choices in OSs now. Most new PCs are sold with some version of Windows installed, but many users are choosing to run UNIX or Linux. Apple Macintosh computers and the proprietary MAC OS have a small but important share of the desktop OS market. This section looks at operating systems used on personal computers and network servers today, describing the basic features of each.

8.1.2.1 DOS (Disk Operating System)

Originally came into use in the 1980s, with the introduction of the IBM PC, which was the first personal computer to be used by consumers and businesses. Two versions of DOS, PC DOS – released by IBM and Microsoft's version MS-DOS were used in the 1980s.

DOS had several weaknesses, supported only one user at a time and was single tasking. It had no built in support for networking of computers. Users had to manually install any drivers (programs that interface between OS & hardware) anytime they added new hardware. DOS was also limited in the amount of RAM and storage space it could support. Even today DOS supports only 16- bit programs, so it does not take full advantage of the power of modern 32-bit and 64-bit processors. It also used a command line interface that forced users to remember not very user-friendly commands and not easy to learn.

In spite of all this DOS is still used because of its size & simplicity. It does not require much memory or storage space for the system and it does not require a powerful computer to run it. Therefore it is used as an embedded OS for devices that run very simple, single-tasking applications. Another reason is that some businesses still run applications developed specially for them and these applications are still marketed for similar businesses.

Figure 6B.1 – page 225 Ref 1

8.1.2.2 Windows 9x

The term Windows 9x refers to the closely related consumer-grade Operating systems, Windows 95, Windows 98 & Windows Me. Though some consider these OSs to be obsolete or outdated now, still some consumers & businesses use them. Windows 95 was introduced in 1995. It is a complete OS and did not require MS- DOS to be installed separately before installing Windows 95. This is different to Windows 3.x (3.0, 3.1 & 3.11) which were not complete OSs but Operating environments which ran on top of MS-DOS to provide a GUI and additional capabilities.

Windows 95 contains some MS-DOS program code that allows it to run DOS based applications. Windows 95 contains 16-bit code that enables it to run pro- grams originally designed for Windows 3.x. This allows companies to run their original programs while migrating to the new OS.

Windows 95 can exchange information with printers, networks and files in 32-bit pieces instead of 16-bit pieces as in Windows 3.x. This makes applications designed with 32-bit processing run faster. It also has improved multitasking and it was the first version of Windows to support the Plug & Play standard for connecting new hardware. It had integrated networking support, improvements to the GUI such as the taskbar & START button which made Windows 95 popular among users.

Figure 6B.3 – page 227 Ref 1

Windows 98, named so because it was introduced in 1998 had one important change, inclusion of the Internet Explorer Web browser with a new feature, the active Desktop that allows users to browse the Internet & local computer in a similar manner. Active Desktop enables users to integrate Internet resources such as stock tickers and new information services directly on the Windows desktop.

Figure 6B.4 – page 227 Ref 1

In 2000 Microsoft released Windows Me (Millennium edition). Notable en-Han cements in Windows Me are: improved multimedia capabilities, built-in sup- port for digital video editing and

enhanced Internet features. This allowed home users to organize photos, make home movies and record and play music in addition to doing usual computing tasks. Windows Me still contained 16-bit code that supported DOS and Windows 3.x applications. As a result, Windows Me was not much more stable or robust than Windows 95 or 98, and was subject to frequent crashes.

8.1.2.3 Windows 2000, XP, 2003

The Windows New Technology (NT) Workstation OS was designed to take ad- vantage of 32-bit processors, and featured multitasking and advanced networking capabilities. Windows NT line was later renamed as Windows 2000.

Windows NT was separated into two products – Windows NT Workstation and the Windows NT Server. Although Windows NT Workstation looks very much like Windows 95, its underlying OS is different:

It is devoid of DOS code, Can be typically used on stand alone PCs that may or may not be part of a network.

Windows XP (XP stands for the wonderful experience that you will have with your personal computer) was released in 2001, has a more three-dimensional look with rounded corners and more shading. Also offers brighter colour choices. With XP Microsoft hoped to avoid the frequent crashes and instability associated with previous consumer versions of Windows requiring frustrating and time-consuming reboots. The OS requires more than 2 Gigabytes (Gb) of hard drive space and more than an hour to install. It only works well on personal computers with at least 128 Mb of RAM and a 400 MHz or faster processor.

Its redesigned icons, taskbar and windows borders make for more pleasant viewing. The start menu is two columns wide with recently used programs in the left column and everything else (e.g., My Documents, My Computer, and Control Panel) in the right column. It comes with Internet Explorer 6 browser software, boasting improved security and reliability features including a one-way firewall that blocks hacker invasions coming in from the Internet.

Windows XP can be run in the classic style or the web style including the ability to run programs or open files with one mouse click. Windows XP can show small images of photos and documents called thumbnails in thumbnail view. It also has Windows Error Reporting (WER), which sends error reports to Microsoft when errors occur, or the OS crashes. WER can also inform users of fixes or patches to avoid future problems.

Figure 6B.6 – page 228 Ref 1

Windows XP is available in several different products:

- Windows XP Professional

- Windows XP Home

- Windows XP Media Center Edition

- Windows XP Embedded

The following features were upgraded in Windows XP:

- Digital Media Support – Through the use of Windows Media Player 9, users of XP can take advantage of digital broadcast support, as well as video and audio rendering for multimedia projects.
- Advanced Networking and Communication – Plug and Play support, which enables the PC to find and use hardware connected via a network, without the user having to configure or install the drivers. Internet Connection sharing is made possible by connecting multiple computers to the Internet via a single connection.

- Advanced Mobile Computing – Through the use of features like Automatic Configuration, you can connect a XP based laptop to a Desktop PC without   needing to know different types of network settings. XP's IrComm modem   support lets you use a cellular telephone to connect to the Internet.

8.1.2.4 UNIX Operating System

UNIX is a powerful OS originally developed by AT&T for minicomputers. UNIX can be used on many computer system types and platforms, from Notebook PCs to Mainframes to Supercomputers and anything in between. But it has no important marketplace among desktop OSs. UNIX can be used to move programs and data among computers easily or to connect mainframes to personal computers to share resources. UNIX is not meant for those looking for a very easy, user friendly interface as it is command driven and requires many commands to do even simple tasks.

However, because of the power of UNIX many users of CAD and CAM soft- ware use UNIX in high-powered workstations. The power and the stability of this OS makes it worthwhile to learn the commands.

There are many variants of UNIX – HP/UX from Hewlett-Packard, AIX from IBM, UNIX System V from UNIX Systems Lab, Solaris from Sun Microsystems and SCO from Santa Cruz Operations.

8.1.2.5 Linux Operating System

Linux is an OS developed by Linus Torvalds in 1991 as a student in Finland. The OS is under the GNU General Public License, and its source code is freely available to anyone. Only the kernel of the Linux OS is given as free: that is the part that controls the hardware, manages files, separates processes etc. Several combinations of Linux are available, with various sets of capabilities and applications to form a complete OS. Each of these combinations is called a distribution of Linux.

The biggest non-technical difference between UNIX and Linux is price. Any- one can get a free copy of Linux on the Internet. Disk based copies are often given free with popular computer books and magazines. Linux is a full 32-bit, multitasking OS that supports multiple users and multiple processors. Linux can run on nearly any computer and can support almost any type of application. It uses a command line interface but windows-based GUI environments called shells are available.

Commercial versions of Linux which are inexpensive when compared to the cost of other powerful OSs are also available from a variety of vendors who provide the Linux code for free and charge for the extras such as utilities, GUI shells and documentation.

The most popular Linux vendors are Red Hat, Novell and Caldera Open Linux. Many individuals and Organizations use Linux now, for example Galileo the large travel and airline-ticketing company uses Linux to run its Internet site. Panasonic is using Linux to run one of its high-speed television tuners. A survey revealed that many CIOs are considering switching to Linux and open-source software because of security concerns with Microsoft software.

Linux has become very popular in student and teacher circles simply because one can participate in the global community that has built up around the OS. This community invites Linux users and developers to contribute modifications and enhancements and it freely shares information about Linux and Linux-related issues.

More than a decade after its initial release, Linux is being adopted worldwide as a server platform primarily. Its use as a home and office desktop operating system is also on the rise. The operating system can also be incorporated directly into microchips in a process called "embedding" and is increasingly being used this way in appliances and devices.

Linux has historically been used mainly as a server operating system, but its low cost, flexibility, and Unix background make it suitable for a wide range of applications. Linux is the cornerstone of the "LAMP" server-software combination (Linux, Apache, My SQL, Perl/PHP/Python) which has achieved popularity among developers, and which is one of the more common platforms for website hosting.

Due to its low cost and its high configurability, Linux is often used in embedded systems such as television set-top boxes, mobile phones, and handheld devices. Linux has become a major competitor to the proprietary Symbian OS found in many mobile phones, and it is an alternative to the dominant Windows CE and Palm OS operating systems on handheld devices. The popular TiVo digital video recorder uses a customized version of Linux. Several network fire- wall and router standalone products, including several from Linksys, use Linux internally, using its advanced firewalling and routing capabilities.

Linux is increasingly common as an operating system for supercomputers. In the November 2005 TOP500 list of supercomputers the two fastest super computers in the world ran Linux. Of the 500 systems, 371 (74.2%) ran some version of Linux, including seven of the top ten.

The Sony PlayStation 3 video game console, scheduled to be released in November 2006, will run Linux by default. Sony has previously released a PS2 Linux do-it-yourself kit for their PlayStation 2 video game console. Game developers like Atari and id Software have released titles to the Linux desktop. Linux Game Publishing also produces games for Linux, licensing and porting them from their Windows source code.

The One Laptop per Child project, which aims to provide computing devices to all children in developing nations, uses Linux as the device's operating system.

Linux is predominantly used as part of a Linux distribution (commonly called a "distro"). These are compiled by individuals, loose-knit teams, and commercial and volunteer organizations. They commonly include additional system and application software, an installer

system to ease initial system setup, and integrated management of software installation and upgrading. Distributions are created for many different purposes, including computer architecture support, localization to a specific region or language, real-time applications, and embedded systems, and many deliberately include only free software. Currently, over three hundred distributions are actively developed, with about a dozen distributions being most popular for general-purpose use.

A typical general-purpose distribution includes the Linux kernel, some GNU libraries and tools, command-line shells, the graphical X Window System and an accompanying desktop environment such as K Desktop Environment (KDE) or GNOME, together with thousands of application software packages, from office suites to compilers, text editors, and scientific tools.

The high level of access granted to Linux' s internals has led to Linux users traditionally tending to be more technologically oriented than users of Microsoft
Windows and Mac OS, sometimes revel ling in the tag of "hacker" or "geek". Linux and other free software projects have been frequently criticized for not going far enough to ensure ease of use.
This stereotype has begun to be dispelled in recent years. Linux may now be used with a user interface that is very similar to those running on other operating systems. Users may have to switch application software, and there are often fewer "known" options (as in the case of computer games) but there exist replacements for all general-purpose software, and general applications like spreadsheets, word processors, and browsers are available for Linux in profusion. Additionally, a growing number of proprietary software vendors are supporting Linux.

Linux' s roots in the Unix operating system mean that while graphical con- figuration tools and control panels are available for many system settings and services, plain-text configuration files are still commonly used to configure the OS and may be exposed to users. In general, the command shell does not protect against accidents like file deletion, and the user interfaces of older programs are sometimes inconsistent.

8.1.2.6 Mac Operating System

IBM system platforms traditionally use one of Windows OSs and Intel micro processors. Apple computers use non-Intel microprocessors designed by Apple, IBM and Motorola and a proprietary Apple OS – the Mac OS. Although IBM and IBM-compatible computers hold the largest share of the business market, Apple computers are very popular in the fields of publishing, education, graphic arts, music, movies and media. Garage band is popular Macintosh software to create music that sounds like a small orchestra. Pro Tools is another software program used to edit digital music.

8.1.2.7 Mac OS X

Apple OSs too have evolved over the years, the Mac OS 9 had a Multiple Users feature, which allowed a Macintosh computer to be shared safely with other people. From July 2001, the Mac OS X was installed on all new Macs. This OS provides a new interface to the users – luminous and semitransparent buttons, scroll bars, windows and fluid animation to enhance the user's experience. Since then OS X has been upgraded, Jaguar (OS X.2) and Panther (OS X.3) being later releases. The Panther which is also called version 10.3 has the same desktop with upgrades to the OS and components such as the Finder, Mail and Address Book, more reliability, automatic Networking and an instant wake-from-sleep capability for portable

computers. New OS X has a modular structure which makes it easier to change and implement faster improvements. Old programs made to run in old Mac OS environments will not run with OS X. To run such programs, the old environment or the classic environment has to be established by running the older OS within the new OS X platform. A company which runs many healthcare advertising campaigns in US uses Mac computers to develop their advertising material. Newer versions of Mac OS X include 3-D effects, fewer virus attacks when compared with Windows OSs, which make it advantageous to use Mac OSs.

- Mac OS X 10.4 Tiger New features in this Mac OS X briefly are: Spotlight, Dashboard, Auto mator, Safari RSS, iCHAT AV, QuickTime 7. With innovative technologies built on a secure, reliable foundation, Tiger turns your Mac into a finely tuned instrument that lets you focus on the tasks at hand, whether that's creating a new workout soundtrack for your iPod, publishing a paper on the human genome or perfecting the special effects in an upcoming movie.

  Seamlessly integrated throughout the system, the new features let you search for what you want instantly. Allows you to get organized without spending time organizing. Enjoy an elegant, uncluttered workspace with- out littering the desktop with unwanted buttons. Know at a glance when your favorite Web sites have published new articles and read them. Brain- storm with your coworkers using personal videoconferencing that looks as elegant as the board room. information from the Internet, such as weather, stocks and airline flights, with ease. Keep all your files in sync across multiple computers .Enjoy a responsive system that won't get bogged down with spyware thanks to well-architected security. Connect without hassles to any network from desktops and laptops. Connect hundreds of digital cameras, printers, audio and MIDI devices. DV camcorders, input devices, storage devices and optical media, scanners and displays using industry standard USB, FireWire (IEEE 1394) and DVI without additional software. Connect Bluetooth devices such as cell phones and input devices securely with encryption and sync with your Address Book and iCal. Print directly to Windows shared printers over the SMB protocol. Send faxes using your built-in modem or Bluetooth cell phone. Set up devices such as network printers and wireless webcams easily with zero configurations. 64-bit applications run side by side with 32-bit applications with no emulation mode. The H.264 codec lets QuickTime 7 render widescreen HD and makes iChat AV videoconferencing crystal clear. Tiger Core Image delivers astounding capabilities and performance for next generation image quality. A UNIX- based foundation provides enough power to be the development platform of choice of major Open Source projects. X grid lets you share your processing resources as a supercomputer node.

- Mac OS X 10.5 Leopard New in Leopard, Time Machine takes you beyond the backup. An automated system that regularly backs up everything on your Mac — music, photos, movies, documents — Time Machine also takes you back in time to restore your system. Enter Time Machine's browser and look for files you may have deleted or lost, flip through multiple versions of the same project, or get a snapshot of your entire system from day one.

  Mail 3 in Leopard – allows one to create invitations, letters, travelogues, and more — complete with photos and graphics — using new Stationery templates. Just choose your template, then use the built-in Media Browser to drag in your photos and more. And when those RSVPs start filling your inbox, you'll stay organized with new Notes and To-Dos you can access from any Mac or PC. Plus, security enhancements including anti-

phishing protection in Mail and Safari make Leopard the safest Mac OS for all your communications.

- The new Intel Chips The result of massive R&D effort involving thousands of engineers from the world's leading chip maker, the Intel Core Duo rep- resents an order-of-magnitude leap in processor design. It's actually two processor cores engineered onto a single chip — offering virtually twice the computational power of a traditional single processor in the same space.

  These Intel Core processors now powers Macs, it does so in a most extraordinary way: by consuming less energy. That's due to the way the cores work together to share resources, and how they are designed to conserve power when their functions aren't required. Because Intel Core processors perform so efficiently, new Macs can be both super-powerful and elegantly slim. Like the Mac Book Pro, which is just one inch thin and as little as 5.6 pounds light, or the iMac, which packs the entire computer and a huge widescreen display into a space previously reserved just for a monitor.

  Figure 6B.7 – page 229 Ref 1

8.1.2.8 OS/2

OS/2 is an operating system created by Microsoft and IBM, later developed by IBM exclusively. The name stands for "Operating System/2", because it was introduced as the preferred operating system for IBM's "Personal System/2 (PS/2)" line of second-generation Personal Computers. OS/2 is no longer marketed by IBM, and support for OS/2 is scheduled to be discontinued on December 31 2006. OS/2 is compatible with DOS and Windows, which means that it can run all DOS and Windows programs. However, programs written specifically to run under OS/2 will not run under DOS or Windows. Since its introduction in the late 80s, OS/2 has traveled a particularly difficult road. The first releases were hampered by a number of technical and marketing problems. Then Microsoft abandoned the project in favor of its own operating system solution, Microsoft Windows.

OS/2 1.0 was announced in April 1987 and released in December as a text mode-only OS. However, it featured a rich API for controlling the video display (VIO) and handling keyboard and mouse events in a sort of protected-mode BIOS. In addition, the video and keyboard APIs were also available to family mode programs running under MS-DOS. A task-switcher named Program Selector was available through the Ctrl-Esc hotkey combination, allowing the user to select among multitasked text-mode sessions (or screen groups; each could run multiple programs).

Communications and database-oriented extensions were delivered in 1988, as part of OS/2 1.0 Extended Edition. The promised GUI, Presentation Manager, was introduced with OS/2 1.1 in November 1988. With proportional fonts, it was a precursor of the later Windows 3.0 look. The Extended Edition of 1.1 introduced distributed database support.

Version 1.2 introduced Installable File systems and notably the HPFS file sys- tem. HPFS provided a number of improvements over the older FAT file system, including long filenames and a form of Alternate Data Streams called Extended Attributes. In addition, extended attributes were also added to the FAT file sys- tem.

The Extended Edition of 1.2 introduced TCP/IP and Ethernet support.

OS/2 and Windows-related books of the late 1980s acknowledged the existence of both systems and promoted OS/2 as the system for the future.

OS/2 2.0, released in April 1992, was touted by IBM as "a better DOS than DOS and a better Windows than Windows". For the first time, OS/2 was able to run more than one DOS application at a time. This was so effective that it allowed OS/2 to actually run a modified copy of Windows 3.0, itself a DOS extender, including Windows 3.0 applications. Also new in version 2.0 was the Workplace Shell, an object-oriented environment that ran on top of the older Presentation Manager GUI.

OS/2 2.0 provided a 32-bit API for native programs, though the OS itself was a mixture of 16-bit and 32-bit code. It also included a new GUI environment called the Workplace Shell. This was a fully object-oriented GUI that was a significant departure from the previous GUI. Rather than merely providing an environment for program windows (such as the Program Manager), the Workplace Shell provided an environment in which a user could manage programs, files and devices by manipulating objects on the screen.

A significant factor in the spread and acceptance of OS/2 2.0 and later releases was Team OS/2, a grass-roots advocacy group formed in 1992.

OS/2 version 3.0, released in 1994, was labeled as "OS/2 Warp" (figure 8.1) to highlight the new performance benefits, and generally to freshen the product image.
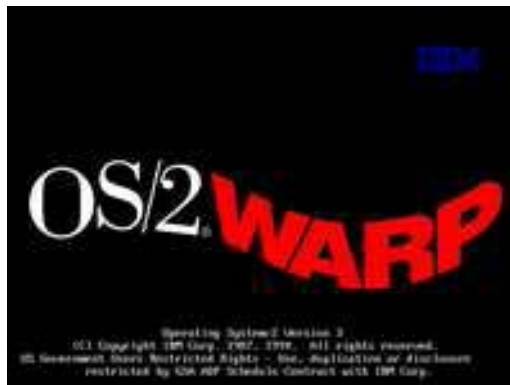

Figure 8.1: The OS/2 Warp 3 startup screen

"Warp" had originally been the internal IBM name for the release: IBM had used Star Trek terms as internal names for past OS/2 releases, and this one seemed appropriate for external use as well.

OS/2 Warp offered a host of benefits over OS/2 2.1, notably broader hardware support, greater multimedia capabilities, Internet-compatible networking, and it included a basic office application suite. OS/2 Warp Connect followed, which had full network support built-in.

Warp 4 was the last widely-distributed version of OS/2, and IBM soon announced the end of marketing the operating system to individual users.

Overall, OS/2 failed to catch on in the mass market and is today little used outside certain niches where IBM traditionally had a stronghold. For example, many banks, especially Automated Teller Machines, run OS/2 with a customized user interface; French SNCF national

railways used OS/2 1.x in thousands of ticket selling machines. Nevertheless, OS/2 still maintains a small and dedicated community of followers. IBM, unlike Microsoft, charged Independent Software Vendors (ISVs) for the OS/2 development kit, while Microsoft gave the Windows SDK away free.

Although IBM began indicating shortly after the release of Warp 4 that OS/2 would eventually be withdrawn, the company has only recently published a definite end-of-support date (2006-12-31). Sales of OS/2 stopped on 2005-12-23. The latest IBM version is 4.52, which was released for both desktop and server systems in December 2001. A company called Serenity Systems has been reselling OS/2 since 2001, calling it eComStation. The latest version is 1.2, released in 2004, and version 2.0 was released early in 2006.

IBM is still delivering fixes and updates on a regular basis. IBM urges customers to migrate their often highly complex applications to e-business technologies such as Java in a platform-neutral manner. Once application migration is completed, IBM recommends migration to a different operating system, suggesting Linux as an alternative.

8.1.2.9 BSD

BSD stands for Berkeley Software Distribution. This was originally developed by the Computer Systems Research Group (CSRG) at the University of California at Berkeley (UCB). BSD started out in late 1977 as a kit of additional software and patches to AT&T's UNIX version 6, which back then ran on the PDP-11 minicomputer. From these humble beginnings, BSD evolved over the course of 15 years into a full-fledged standalone UNIX operating system. It shares Linux' technical prowess and open-source development drive.

8.1.2.10 Network Operating Systems

A network operating system (NOS) is an OS that is designed to run on a network server dedicated to providing various services to other computers on the network. The "other" computers are called client computers and each computer that connects to a network must run client software designed to request a specific service. These OSs are optimized to provide network services with support for multiple processors and support for redundancy. Redundancy is provided in two ways: by duplicating data on drives and one network server being a "mirror" of another server and being available immediately if the first server fails.

Windows NT Server

This has the same core as the Windows NT Workstation, but has additional facilities such as security features for grouping and authenticating users and con- trolling their access to network resources. NT supports the use of many hard disks, working together to store huge amounts of data. The same data is written to multiple disks to provide redundancy, so it is preserved in case one disk fails.

Windows Server 2000

Introduced in the year 2000, this network OS is available as three products. All of them manage large amounts of data about the users of the network and its resources. A generic name for such a specialized database is enterprise directory. Has the same user interface as Windows 2000 Professional. The three products are:

- Server Standard Edition This version is suitable for use as a network server for the average business with support for symmetric processing (SMP) with up to two processors.

- Advanced Server Supports symmetric processing (SMP) with up to four processors, enhanced balancing of network and component loads, support more RAM and print clustering which allows grouping of print servers to provide alternate printers if one print server fails.

- Data Center Server the most powerful of the three optimized for use as a large scale application server, such as a database server. SMP support for up to 32 processors is available. This product is not sold separately, but is sold through computer manufacturers bundled with the very powerful server computers.

Windows Server 2003

The technology of today has to support wide network usage, data-storage requirements and extremely fast data processing speeds. Microsoft designed Windows Sever 2003 to meet the requirements of Web sites and corporate Web applications on the Internet. Two products were introduced in April 2003, Windows Server 2003 Standard Edition and Data Center Server. Both have a Windows XP-style interface, designed to support Web-based applications, large databases, e-commerce servers and distributed applications. The network in such cases can be the Internet or a corporate intranet or an extranet. Microsoft hopes that this Netware will be able to compete with UNIX, which dominates the very high-end enterprise network servers.

- Windows Server 2003 Standard Edition This version is suitable for use as a network server for the average business with support for symmetric processing (SMP) with up to two processors.

- Data Center Server The most powerful of the server editions, optimized for use as a large-scale application server, such as a database server. Includes the Advanced Server features and SMP support for up to 32 processors is available.

Novell Netware

Novell Netware is one of the most popular network operating systems through the 1980s and 1990s. NetWare server, Linux Server products such as SuSE Enterprise and SuSE Standard, Novell NetWare server are all products offered by Novell. SuSE Standard is suited for departments or small businesses while SuSE Enterprise can support a broad range of computers including mainframes. The NetWare and SuSE Enterprise products support distributed applications.

UNIX for Servers

UNIX is selected as an OS for Internet hosting computers because of its reliability and its ability to work with many kinds of hardware. UNIX is used as a network operating system among organizations that mange large databases shared by many users in industries such as insurance, medicine, banking, manufacturing and as mission-critical servers.

Linux for Servers

Used in small businesses and the home market to provide Internet and networking services. As an open operating system it is cost-effective when compared to other OSs for sharing files, applications, printers, modems and Internet services. Red Hat and Novell have brought out products bundled with Linux targeting large organizations, where the Linux OS is free but other utilities and documentation has to be paid for.

8.1.2.11 Embedded Operating Systems

Palm OS, Symbian OS, Windows XP embedded, Windows CE.NET, Pocket PC OS and Windows Mobile are miniaturized OSs designed to run on small computing devices such as handheld computers. These are built into the circuitry of the device unlike OSs which reside on a magnetic disk. Medical equipment, cell phones, PDAs, bar-code scanners are some devices containing embedded OSs.

8.1.3 Utilities

Operating systems are designed to let you do most of the tasks such as managing files, loading programs, printing documents etc. Software developers continue to create new programs called utilities that enhance or extend the OS's capabilities. As an OS is improved and updated, the functions provided by the utility programs may be included with subsequent releases of the OS. Utility programs are usually used to merge and sort sets of data, keep track of computer jobs being run, compress data files and perform other important tasks.

Utility programs usually come installed on computer systems, but a number of utility programs can also be purchased or can be downloaded free from the Internet.

Hardware Utilities

Those utility programs that can check the status of all parts of the PC including hard disks, memory, modems, speakers and printers.

Disk utilities check the hard disk's boot sector, file allocation tables and directories and analyze them to ensure that the hard disk has not been tampered with. They can also optimize the placement of files on a crowded disk.

Virus Detection and Recovery Utilities

Computer viruses from the Internet and other sources can completely disable a computer. Virus-detection and virus-recovery software can be installed to monitor and protect the computer. Virus detecting software must be updated regularly as new viruses introduced all the time. Symantec, McAfee are two companies that make virus detection and recovery software.

File-Compression Utilities

These programs can reduce the amount of disk space required to store a file or reduce the time it takes to transfer a file over the Internet. A popular program on Windows PCs is WinZip. MP3 (Motion Pictures Experts Group Layer 3) is a popular file-compression format used to store,

transfer and play music. It can compress files 10 times smaller than original with near-CD-quality sound. Software, such as iTunes from Apple can be used to store, organize and play MP3 music files.

Spam and Pop-Up Blocker Utilities

Getting unwanted e-mail (spam) and having unwanted advertisements pop up on your display screen when you are browsing the Internet can be a big waste of time. A number of utility programs are available to block unwanted e-mail and pop up ads.

Network and Internet Utilities

These monitor hardware and network performance and trigger an alert when a Web server is crashing or a network problem occurs. Topaz from mercury Inter- active is an example of software called an advanced Web-performance monitoring utility. It is designed to sound an alarm when there are problems and also to let network administrators isolate the most likely problem.

Server and Mainframe Utilities

IBM has created systems-management software that allows a support person to monitor the growing numbers of desktop computers in a business attached to a server or mainframe computer. With this software, a support person can sit at their personal computers and check or diagnose problems, such as a disk failure on a computer on a network. The support person can even repair individual systems anywhere on the organization's network often without having to leave their desk. There are software that allows a manager to see every keystroke a worker makes on a computer system. Monitoring software can catalog the Internet sites that employees visit and the time that employees are working at their computers.

Backup Utilities

Backup utilities allow you to copy large groups of files from your disk to tape or CD for safekeeping. They also help to organize files, update backups and restore backups to disk in case of data loss.

Firewall

A firewall is a specialized computer that is dedicated to examining and blocking traffic coming and going to the Internet. Highly trained people are needed to manage firewalls. Software firewalls too are available for smaller systems. Windows XP comes with a simple firewall that you can optionally turn on through the Properties dialog of each network connection.

Intrusion Detection

These notify you of certain types of intrusion attempts. Intrusion detection may be added as a feature to a firewall or bundled with Internet security programs.

8.1.4 Drivers and Device Installation with Windows 2000

A device driver is a program that allows a specific device, such as a modem, network card, or printer, to communicate with an OS such as Windows 2000. These programs are called drivers because they allow the OS and other programs to activate and use the said devices For example, without serial port drivers, Network Connections cannot use a modem to connect to a network. Although a device may be installed on your system, Windows 2000 cannot use the device until you have installed and configured the appropriate driver. If a device is listed in the Hardware Compatibility List (HCL), a driver is usually included with Windows 2000. Device drivers load automatically (for all enabled devices) when a computer is started, and thereafter run invisibly.

In Windows 98, Me, NT, 2000 or XP the printer drivers are already built into the OS. If it is not then it has to be installed from the disk that comes with the printer. Printer manufacturers release updated versions of their printer drivers from time to time. They may be downloaded from the manufacturer's website too.

To install a device

- Connect the device to the appropriate port or slot on your computer, ac- cording to the device manufacturer's instructions. You may need to start or restart your computer.

- You may require administrative privileges to add and set up a Plug-and-Play device. You need administrative privileges if installing the device requires a user interface or if you experience errors during the installation process. To add and set up a non Plug-and-Play device connected directly to your computer, you must be logged on as an administrator or a member of the Administrators group. If your computer is connected to a network, network policy settings may also prevent you from completing this procedure.

- If an administrator has already loaded the drivers for the device, you can install the device without administrator privileges.

- If you need to start or restart your computer, Windows 2000 or the OS you are using should detect the device and start the Found New Hardware wizard.

- If you need to install a device, such as a sound card, into a slot inside your computer, shut down Windows and turn off the computer. Remove the computer cover and install the device in the appropriate slot. Replace the computer cover, and then turn the computer on.

- If your device did not install properly, you may have an older, non-Plug and Play device. For more information about installing a non-Plug and Play device, see Related Topics.

- If prompted, follow the instructions on the screen to choose a destination path to install drivers for the device.

- If the device is a small computer system interface (SCSI) device, connect it to the SCSI port on your computer according to the device manufacturer's instructions. Restart or turn on your computer.

- You need to be sure that the device number for the SCSI device is not used by another SCSI device. To change the device number, see the device manufacturer's instructions.

- If the device is a universal serial bus (USB) or IEEE 1394 device, plug it into any USB or IEEE port on your computer. Follow the instructions that appear on your screen.

- You do not need to shut down or turn off your computer when you install or plug in a USB or IEEE 1394 device. Although USB and IEEE 1394 are similar technologies, you cannot interchange USB connections with IEEE 1394 connections.

- If you are not an administrator or a member of the Administrators group, you can use Run as to perform certain administrator functions. For more information on how to use Run as, see Related Topics.

To install a non-Plug and Play device

- Open Add/Remove Hardware in Control Panel.

- Click Next, click Add/Troubleshoot a device, and then click Next. Windows 2000 attempts to detect new Plug and Play devices.

- If your device is not in the device list, click Add a new device.

- Click Next, and then do one of the following:

- Click Yes, search for new hardware if you want Windows 2000 to try and detect the new non-Plug and Play device you want to install.

- Click No, I want to select the hardware from a list if you know the type and model of the device you are installing and you want to select it from a list of devices.

- Click Next, and then follow the instructions that appear on your screen.

- You may require administrative privileges to add and set up a Plug-and-Play device. You need administrative privileges if installing the device requires a user interface or if you experience errors during the installation process. To add and set up a non Plug-and-Play device connected directly to your computer, you must be logged on as an administrator or a member of the Administrators group. If your computer is connected to a network, network policy settings may also prevent you from completing this procedure.

    – To open a Control Panel item, click Start, point to Settings, click Control Panel, and then double-click the appropriate icon.

    – If you are not an administrator or a member of the Administrators group, you can use Run as to perform certain administrator functions. For more information on how to use Run as, see Related Topics in the Widows 2000 – Installing devices

Set up a new printer

- On the Windows Start menu, point to Settings, and then click Printers.

- Double-click the Add Printer icon.

- Follow the instructions in the Add Printer Wizard.

- If you want to print a test page, make sure your printer is turned on and ready to print.

- If you want to use a shared network printer, you can double-click the Net- work Neighborhood icon on the Windows desktop to set up the printer quickly. Double-click the computer that is connected to the shared printer. Click the printer icon, and then click Install on the File menu.

Using Windows 2000/XP Operating Systems to install a new device

- When a new device is installed in your computer windows will automatically detect it. Windows will either find a driver for the device and install one on its own or it will ask you for drivers for it.

- Cancel this, insert the manufacturers disk in CD/DVD drive. It should auto start and then show a list of install options. Simply click install to install the device drivers, at the end a reboot would be required. After this reboot the device should be operational.

- If the manufactures disk doesn't have an auto run program and just simply provides the drivers on the disk, then you must not cancel the screen when it asks you to install the drivers. Instead click next. You can now do it in two ways, let windows install the device automatically, or if you know where the drivers are you can select them manually. Windows recommends the first option, this should be used first, and if it doesn't succeed use the second option and browse the CD for the driver.

Easy Install of Software

If you purchased a game and want to play it, you need to install it in your computer. Most times this is done by simply inserting the CD in the CD-ROM drive while computer is running and the game will automatically start up. But sometimes it may be necessary to follow the steps given below:

- From start menu click settings, control panel, add/remove programs.

- From the add/remove programs dialog box choose "install". Make sure your software media is in the drive.

- Choose next so windows can detect your software.

- Windows may find the setup.exe file and choose "ok" or "next".

- If windows didn't find it, we need to take a look at the disk itself and hunt it down.

- From start button, click programs, go towards bottom of list and click "windows explorer".

- In windows explorer choose the drive were your installation disk is.

- Now simply browse the disc for a execute file such as "setup" or "install" as an example. If this does not work, then the manufacturer's directions have to be followed.

Application Software

Any computer program used to create or process data can be classified as Application software. Some examples of Application software are Word processing programs, Spreadsheet programs, Database management programs, Desktop publishing programs and Presentation programs. Application software allows people to increase their productivity. They may be used for performing day-to-day tasks in homes, schools and offices.

Major Application software types

There are two major types of application software, those developed by an individual, company or organization to perform some specific tasks. This will be one-of-a-kind program and owned by the individual, company or organization that will use the program. These types of application software are called Proprietary software. An outside company may develop such software for the user, it is called contract software.

People may even purchase or acquire an existing software package to accomplish some tasks for them and such software are called off-the-shelf software.

Figure 4.8 – page 159 Ref 3 – Types of Application software

Criteria for selecting off-the-shelf software

- Will the Software run on existing OS and Hardware that one has

- Does the software perform all the tasks needed

- Is the Software manufacturer financially solvent and reliable?

- Is the total cost of purchasing, installing, training and maintaining the software economically justifiable

Table 4.5 – page 159 Ref 3 – A comparison of Proprietary and off-the-shelf software
It is possible customize the off-the-shelf software by doing the required modifications. Software vendors will provide such services, as modifying the software to suit the customers' needs, installation, training of end users and other consulting services. Such services may have to be paid by the customer in addition to the software cost.

Another approach to obtain customized software is to use the services of an Application Service Provider (ASP). An ASP is a company that provides soft- ware, end-user-support and the computer hardware on which to run the software from the user's location. There are advantages to such an arrangement such as speedy deployment of the software needed, reduce the need for many skilled IS staff, reduce project start-up expenses. However there are risks in using an ASP. Sensitive information may get leaked by unauthorized access; the ASP might not be able to provide an uninterrupted service. In case of natural disasters the ser- vice may be not available. These are some of the factors to be considered in using an ASP.

Personal Application Software

There are many computer applications that can help individuals at home, school and work and the following table 8.1 summarizes them.

Word Processing: Majority of personal computers have word processing applications installed in them. These applications help us to create, edit and print documents. Spell checking, creating tables, inserting formulae, creating graphics, mail merging are some of the features available in many word processing packages. These packages can be used in collaborative work too, for example a group of authors and editors can develop a book and they can use the "track changes" and "reviewing" features in Microsoft Word. Comments can be inserted or revisions made which a co-worker can review and either accept or reject.

Spreadsheet Analysis: A spreadsheet package can be used when numbers and calculations are involved. Some of the features of spreadsheets are graphics, limited database capabilities, statistical analysis and built-in business functions. Optimization is another powerful feature of spreadsheets.

Database Applications: Used to store, manipulate and retrieve data. Manipulations include merging, editing and sorting data.

Online Information services: May be used to connect a personal computer to the outside world trough phone lines, cable, satellite or power lines. These services can be used to obtain news around the world, get investment information, make travel plans, get prices & features for most consumer items, send e-mails to friends and family, get involved in learning programmes and get employment opportunities etc.

Graphics Programs: Can be used to develop attractive graphs, illustrations and drawings. Advertising brochures, announcements and full-colour presentations can be turned out easily using these programs. Most graphic programs contain clip art, which can be included in the presentations.

Project management software: These programs help project managers, business managers, and planners manage schedules and resources. Helps to set up projects quickly, communicate project data, and track and analyze projects The Enterprise Project Management (EPM) solution can help the entire organization work together to more efficiently complete projects. You can have more control over projects, centralize resources, automate processes, and improve team collaboration.

First and foremost it is only a tool that project managers can use. It does not do project management for them; neither does ownership of the product make you a project manager.

The program can do the calculations accurately. It makes visible the parameters it needs and any problems. It allows "what-ifs?" to make changes to the project and see the effect of those changes before finalizing your plan and committing it to work. Once your plan is in action, it allows progress to be tracked so that you can make adjustments to keep on target. And finally it is a tremendous aid to communication. There are built-in reports to print. You can export to PowerPoint for presentations, to Word for detailed reports, to Excel to do intricate cost analyses, and to Access for manipulation of project data. You can send information by e-mail. You can pass information over networks and the Internet.

Financial management programs: Sound, responsible financial management is at the heart of business success. Financial management software is de- signed to help people work efficiently, focus on tasks that add the most value, and collaborate productively. Tasks are streamlined and functions are connected to help reduce busy work and redundancies. These software help to accelerate and simplify financial management at many levels. Bring formerly disparate sources of information into a single view of events and help to ensure that the right people can take action. These accomplishments can include reducing the time for monthly closes, shortening the accounts receivable wait, invoicing with greater ac- curacy, and increasing return on investments in technology, skills, and processes. It is possible to review financial information in your spreadsheet program or insert the data in a document that is open in your word processing application. Provide reports and other business data in a business portal on the company intranet for financial managers who are collaborating across the company, and across the globe. Or make financial information available on the company's extranet with security enhancements to promote privacy for auditors or board members.

These software can provide tools and insight to help a team make more in- formed decisions. These tools and insights can help a company set a competitive direction for the business. Financial management tools present many ways to report, analyze, and publish financial information. Information can be exported into a spreadsheet for further analysis. Flexible report creating capabilities helps to present business information in the best format for an audience.

Desktop publishing (DTP) programs: These can be used to create attractive, professional documents for many purposes. In Marketing DTP software can produce Postcard Mailers, Customized Letters, Flyers, Sell Sheets, Brochures, Catalogs, Posters, Advertisements, Point-of-Purchase Materials, Presentation Folders, and Customized Proposals. In operations, Order Forms, Price Lists, Internal Business Forms, Invoices, Purchase Orders, Stationery, Mailing Labels, Reports can be created using DTP software. In the retail trade Clothing Tags, Restaurant Menus and in manufacturing Price Lists, Product Labels, Packaging are created using these software. Instructional Material needed for ser- vice businesses can be created easily. In publishing Books, Magazines, Manuals, Directories DTP software is used widely.

Creativity software: They allow a person to meaningfully develop ideas after initial idea generation and also encourage building new connections between ideas. The software contains a database of ideas to stimulate fresh thinking. These also allow one to write ideas down and then flexibly move them around to see new relationships, insights and perspectives. Thinking templates allow one to visually consider all the factors and opinions before evaluating for action. Modeling of all detail can be done, over viewing on screen and modify as needed. Allows one to get a grip of random thoughts and information overload by mapping visually and easily organizing and reorganizing ideas on screen. Encourages the logical and the intuitive side of

our brains to work together - combine left and right brain thinking. Helps as a writing aid through more effective planning prior to writing essays, reports and creative writing. Accelerate learning by engaging the whole brain thinking and ease of mapping out knowledge and ideas. Organize ones thoughts and link to other knowledge by structuring ones thinking by easily linking any idea immediately to another hexagon model or any other file on ones computer or the internet – this feature alone can transform the idea management.

Workgroup Application Software

These software support people to work as a team whether they are in the same location or geographically dispersed around the world. Also known as group-ware. Allow people to communicate and do collaborative work. For successful implementation of groupware, the following criteria need to be satisfied.

- Convenient – Should be easy to use (as the telephone)

- Content – Must provide a constant stream of rich, relevant and personalized content

- Coverage – It should be close to everything needed, otherwise it will not get used

Examples of groupware include group scheduling software, e-mail and other software that enable people to share ideas. Some examples of groupware are Lotus Notes from IBM and Microsoft Exchange Server 2003.

Enterprise Application Software

This is software that can be used within an entire organization. Example: A fast food chain with number of franchise holders spread out in the country or globally. The software can be developed in-house or purchased.

Organizations having multiple sites spread out globally are now turning to enterprise resource planning (ERP) software, a set of integrated programs that mange the organization's very important business operations. Such ERP systems must support multiple legal entities, multiple languages and multiple currencies.

Some examples of Enterprise Application Software

1. Accounts receivable

2. Accounts payable

3. Airline industry operations

4. Automatic teller systems

5. Cash-flow analysis

6. Credit & charge card administration

7. Manufacturing control

8. Distribution control

9. General ledger

10. Stock & bond management

11. Savings & time deposits

12. Inventory control

13. Sales ordering

14. Order entry

15. Payroll

16. Human resource management

17. Check processing

18. Tax planning & preparation

19. Receiving

20. Restaurant management

21. Retail operations

22. Invoicing

23. Shipping

24. Fixed asset accounting

Figure 4.17– page 170 Ref 3

Application Software for Information, Decision Support an Specialize Purposes

This kind of software is found in every industry now. Some examples are:

Software used to analyze many different scans of tumors in human beings to create a 3-D view of them. Having done that the software can then consider the thousands of angles & doses of radiation and determine the best radiation program to be administered. This analysis takes only a few minutes but it can save the patients many years of life.

Music executives use decision support software to determine the next hit song.

Genetic researchers use a program called Gen Vision to visualize and analyze the human genome.

Many businesses use such programs to increase their profits, productivity and effectiveness and reduce costs. We have to keep in mind that all above discussed programs/software are written by human beings using programming languages.

Type of software	Explanation	Example	Vendor
Word Processing	Create, edit and print text documents	Word Word Perfect Writer	Microsoft Corel Open Office
Spreadsheet	Has built in functions to do statistical, financial, logical, database, graphics, and date & time calculations	Excel Lotus 1-2-3 Calc	Microsoft Lotus/IBM Open Office
Database	Store, manipulate and retrieve data	Access dBASE Base	Microsoft Borland Open Office
Online Information services	Obtain information from commercial services	America Online MSN	America Online Microsoft
Graphics	Develop graphs, illustrations, presentations and drawings	Illustrator Freehand PowerPoint Draw	Adobe Macromedia Microsoft Open Office
Project management	Plan, schedule, allocate and control resources (people, money, equipment, time & technology) needed to complete projects	Project for Windows	Microsoft
Financial management	Income & expense tracking, monitor & plan budgets	Managing your money Quicken	Meca software Intuit
Desktop publishing (DTP)	To create high-quality printed output	Publisher PageMaker Ventura Publisher	Microsoft Adobe Corel
Creativity	The software takes the users through a routine, naming a problem, organizing ideas & "wishes" and offering new in- formation to suggest different ideas or solutions	Organizer Notes	Macromedia Lotus

Table 8.1: Application Software